

Medicinal Herb Production In Northeast Saskatchewan 1998



Establishment of the Northeast Demonstration Site at Tisdale May 29th, 1998



Conservation Learning Centre site establishment August of 1998

Coordinated by:

NorSask Botanicals
Sask. Ag. & Food
Herb Research Program
Sask. Herb & Spice Assoc.

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Project Objective

To assist producers in Northeast Saskatchewan to establish a new agricultural industry involving the production, processing and marketing of medicinal herbs.

- To maintain medicinal herb demonstration sites that will allow growers to observe a variety of medicinal herbs throughout the plant development.
- To gather data such as plant adaptability, yields, weed control and other production problems to help producers assess the economic feasibility of medicinal herb production.
- Evaluate the cultivation of native species that have an identified commercial potential such as fireweed.

Project Description

Medicinal herbs offer a new option to small farmers and acreage holders due to their high value, relatively small acreage requirements and a rapidly expanding market. High value herbs destined for the medicinal market are generally organically grown, offering a more sustainable farming option. A great deal of interest has been stimulated across Saskatchewan in the production of herbs. However there is very little information available on the production practices and the economics of producing medicinal herbs in our climatic conditions. Lack of reliable information on processing and marketing of medicinal herbs is another limiting factor.

Demonstration sites will provide farmers with an opportunity to look at these new crops. They allow the collection of production information such as cost, yield, and labour requirement. They also provide herb products for quality analysis, test processing and test marketing. The location of the two primary sites are as follows:

The Northeast Demonstration Farm, six miles north of Tisdale on highway # 35
Contact persons include: Leroy Bader PAg, Extension Agrologist @ 878-8805
Dianne Desrosiers, Project Coordinator @ 862-3932

The Conservation Learning Centre, south of Prince Albert on highway #2.
Contact persons include: Barry Swanson PAg, Extension Agrologist @ 953-2780
Jo Detillieux, Project Coordinator @ 764-8207

As both of our primary sites have heavy clay soil compositions, which makes harvesting of root crops difficult, a secondary site was established on a farm 4 miles west of Bjorkdale. The soil conditions on this site are sandy - loam and more favourable for harvesting root crops. Echinacea, valerian and burdock are the three crops being tested at Bjorkdale.

All the sites are signed and have self guiding plot information available so producers can stop and view the plants at different stages of growth and at a time that is convenient to them.

Selected Plants

The selection of herbs for production in plots reflects the economic importance of the herb and its adaptability to the climate and agricultural practices of northeast Saskatchewan. With these parameters in mind the following plants were selected:

- Echinacea angustifolia
- German Chamomile
- Burdock
- Valerian
- Fever few
- Astragalus
- Fireweed
- Senega root

Plot Parameters:

- The production of herbs will follow commonly adopted practices of growers where available
- Plant establishment will primarily be with the use of plugs and where direct seeding appears feasible comparisons will be looked at.
- Since the medicinal market looks at organic production as a quality factor, the plots will be maintained using organic practices.
- Variables that will be demonstrated with the plot layout include:
 - Plastic mulch/no mulch
 - Irrigation/no irrigation
 - Direct seed/transplants
- Plot size will vary with the herb and expected harvest procedure.

Agronomic Information:

Echinacea angustifolia:

CLC Site:

Direct seeding was done on May 29th. Plant spacing between plants was 4" and 4" between rows. Stratified seed was mixed with a small amount of sand and laid on the surface of the soil. Germination was 45% in the non-irrigated plot and 95% in the irrigated plot with emergence occurring in 6 - 14 days. Transplants were established on July 24th. Survival rate was 94% with irrigation and 78% non-irrigated.

Tisdale Site:

Direct seeding was done on May 29th. Three rows 8" apart with a plant spacing of 8" were established using stratified seed which was mixed with sand and laid on the soil surface. Germination took 12-17 days. The irrigated plot sowed under poly showed 85% germination compared to 22% germination in the no irrigation/no poly plot. The plants remain quite small for the first few months of development making weed pressure in the no poly plots challenging.

Transplanting was done on July 19th. Survival rate was 80% in the poly plot and 75% in the no poly plot. On June 30 we received the last of our Echinacea transplants however they were not healthy upon arrival and did not survive transplanting.

Bjorkdale Site:

Direct seeding was done on May 29th. Stratified seed mixed with sand was planted in the row 8" apart with 8" plant spacings. Due to heavy weed pressure at this site direct seeding without the use of poly showed less than 10% germination, while the poly plot showed 65% germination.

Transplanting was done on July 19th. Transplants on the poly plants had 75% survival rate and non-poly plot showed 57% survival. Some of the transplant loss may have been due to excess moisture conditions as plants browned off, then began to come back from the root.

We harvested third year root at the Tisdale Demonstration site on Sept. 24th, the average weighed was 1.2 oz./dry root. We also harvested third year purpurea root which averaged 1.5 oz./dry root.

Burdock

CLC Site:

Direct seeded on May 25th. Seeds were hand placed at 8" intervals into holes in the plastic and covered with 1/2" of soil. Germination took 5 days to 2 weeks. Under irrigation, germination was 75% whereas without irrigation, germination was 68%.

Harvesting was done on October 6, 1998 with a small U-bar digger. This is not recommended as it only penetrated from 12-15 inches which is inadequate. A large U-bar digger is required with a depth of 24-30 inches. The roots were then washed and stored.

Tisdale Site

Direct seeding was done on May 26. The seeds were placed 4" apart with row spacings of one foot. The seeds were hand planted then covered with 1/2" of soil. Germination took nearly two weeks with little or no difference between the irrigated and non-irrigated plots. We received adequate rainfall during this period, which would account for the even germination. Germination rate was 80%. The roots were harvested on September 18 by hand using a spade. This is not only labour intensive but also makes it very difficult to obtain the entire root. The soil was hard making it difficult to uproot the plants.

Bjorkdale Site:

Direct seeded on May 29. Seeding was done the same as at the Tisdale site. Germination was 85% in all plots and took between 10-14 days. The Bjorkdale site had abundant rainfall all through the year, with over 14 inches recorded throughout the growing season. There was no irrigating done as there was adequate moisture at all times. The roots were harvested on Sept. 21 using a spade. The task was a little easier due to soil texture but this would still not be the recommended method of harvesting. The roots were then washed, weighed and dried.

Yields

	Total pounds (fresh)	# Of Roots	Average wt/root
CLC Site			
Irrigated /poly	45.2	145	.31
Non-irrigated/poly	54.2	137	.39
Tisdale Site			
Non-irrigated/no poly	23.6	53	.44
Non irrigated/poly	26.9	48	.56
Irrigated/no poly	22	47	.46
Irrigated/poly	25.4	29	.87
Bjorkdale Site			
Non irrigated/no poly	30.2	71	.42
Non irrigated/poly	35.8	73	.49

General observation: there was very little difference in the size of root between the two soil types. However, harvesting of the root remains much easier in the lighter soil type.

Valerian

CLC Site:

Direct seeding was done on May 26th. Rows were spaced one foot apart with one-foot spacings between plants. Germination took 2-3 weeks with the irrigated plot having 95% germination and the non-irrigated plot 85%.

Transplants were established June 29th with the same spacings as direct seeding. Survival rate was 88.5% in irrigated plots and 90% in non-irrigated plots. There was some indication that aster yellows were more apparent in the irrigated row than the non-irrigated row.

Tisdale Site:

Direct Seeding was done on May 26th. Two rows spaced one foot apart with seeds every 3-4 inches, lightly covered with soil. Germination took 2-3 weeks, with 12% in non-irrigated/no poly, 45 % non-irrigated/poly, 24%irrigated/no poly, and 60% irrigated/poly.

Transplants were established May 26th at the same row spacing as direct seeding. Survival rate was over 80% in all plots.

Bjorkdale Site:

Direct seeding was done in the same manner as Tisdale on May 29th. Again due to very heavy weed pressure and slow emergence the no poly plots did not survive well and were noticeable smaller plants than the poly plots.

Transplants were established on May 29th. Rows were spaced one foot apart with 6' between plants. Survival on both poly and no poly plots was above 80%, however the poly plot showed substantially larger healthier plant growth.

Feverfew

CLC Site:

Direct seeding was done on May 29th. Seeds where placed on the surface of the soil in two rows spaced one foot apart with one foot between plants. Germination took between 2-3 weeks; irrigated plot had 54% germination and 40% in the non-irrigated plot.

Transplants where put out on June 23rd. Survival was 91% on irrigated plot and 86% on non-irrigated plot.

On August 28th the aerial portion of the plant was harvested leaving 4-6" at the base. The product was then washed and dried on racks out of the sun.

Yield:

Irrigated plot 6.48 lbs. (dry)

Non-irrigated plot 6.13 lbs. (dry)

Tisdale Site:

Direct seeding was done on May 29th. Seed was surface sown in two rows 16" apart and 15" between plants. Germination was very slow taking up to 3 weeks. The non-irrigated/no poly plot had less than 20% germination and the irrigated/no poly plot was only slightly higher. The plots sown in the poly had 25% germination in the non-irrigated and 75% in the irrigated plot. This was our first try at direct seeding feverfew and indications are that transplanting insures proper plant population. Plant stand in the direct seeded plots was not substantial enough to harvest for '98.

Transplanting was done on June 23rd. The transplants were already in 25% bloom when they arrived so we did not take a first cut on the plants as to leave sufficient time for root development. The survival rate on all the plots was above 90% showing that it is relatively easy to transplant and does not suffer from transplant shock.

On September 21st we harvested the aerial portion of the plant leaving 3-4" at the base. The herb was then washed and free-air dried in the dark.

Feverfew Yield

	# Of Plants	Fresh Weight	Dry Weight	Dry wt./plant
Tisdale Site				
Irrigated/poly	34	15.9 lb.	4.71 lb.	0.13 lb.
Irrigated/no poly	11	2.0 lb.	1.04 lb.	0.09 lb.
Non irrigated/poly	32	14.6 lb.	4.58 lb.	0.14 lb.
Non irrigated/ no poly	10	1.5 lb.	0.75 lb.	0.08 lb.

Astragalus

CLC Site:

Direct seeding was done on May 29th. Seeds were placed 1/4" deep in two rows spaced one foot apart with one-foot spacing. Germination took 1-2 weeks. Germination rate in the non-irrigated/poly plot was 63% and 73% in the irrigated/poly plot. Most of these young seedlings were lost in early July due to heavy rain.

The transplants were put out on June 8th. The heavy rain did not effect the transplants as bad and there was little evidence of transplant shock. There was very little difference in the survival and performance between the irrigated and non-irrigated plots.

•Tisdale Site:

Direct seeding was done on May 29th. Seeds were place 1/4" deep in two rows spaced one foot apart with 8" between plants. Emergence took up to 3 weeks and all plots showed less than 20% germination. Transplants were put out on June 9th. survival on the irrigated/poly plot was 90% and 80% on the irrigated no/poly plots. Non-irrigated/ no poly plots had a survival of 75% and 80% in the non-irrigated poly plot.

We dug a row of astragalus that was seeded in 1995 at the Northeast Demonstration Site. The root was washed, dried, then weighted. Using the dry weight it would take 30 roots to make one pound.

German Chamomile

CLC Site:

Direct seeding was done on May 29th. Seeds were placed 1/4" deep into two rows 8" apart with 8" between plants. Emergence took up to 10 days. Germination in the irrigated plot was 45% compared to 50% in the non-irrigated plot.

Transplanting was done on June 2nd with spacing similar to the direct seeded plot. Moisture conditions were poor at this time and the irrigated plot showed 98% survival compared to 60% in the non-irrigated plot.

On August 11th the blossoms were harvested with a blueberry picker then dried on racks in the dark.

Yield:

Non-irrigated	1.03 lb. (dry)
Irrigated	1.53 lb. (dry)

Tisdale Site:

Direct seeding was done on May 29th. Seeds were placed 1/4" deep in two rows 8" apart with 8" in between plants. Germination took up to 2 weeks and was less than n 20 % in all plots.

Transplanting was done on June 6th. Two rows 8" apart and 8" between plants were established. The non-irrigated/poly had an 80% survival rate and 90% in the irrigated/poly plots. The plots which did not have poly for weed control did not do as well. Yield was not recorded due to the lack of equipment to harvest. We now have access to a chamomile rake which will be used to harvest next year.

Fireweed

Surface applied seeding at both sites was done on June 20th and had less than 2% germination.

Transplants were put out on August 28th. Two rows one foot apart with one foot spacing between plants were established. The plants were two feet tall and suffered greatly from transplant shock. The weather was hot, dry and windy further hindering survival. Approx. 35% of the plants turned brown and dried back, however after close inspection we found the plant to be generating new shoots from the root.

Senega

The Senega root was transplanted during the last week of May. The plants survived transplant but due to the heavy clay soil at both the Tisdale and Prince Albert site, did not perform well during the remainder of the year.

A producer from NorSask Botanicals did some wildcrafting of root in the fall of 1998. The roots were very small and it would take nearly 80 dried roots to make one pound.

* Please keep in mind that these sites do not have replicated plots. Their main purpose is for visual demonstration. The yields and agronomic information gathered will be used in conjunction with the AIMS Cost of Production Survey for Northeast Saskatchewan.

Weed Control

The Tisdale plot had heavy weed pressure. All the weeding was done by hand or with the aide of a garden tiller. Grass was sown between the rows to help prevent erosion and reduce weed pressure. Our technician timed how long it took to weed the poly plots in comparison to the non-poly plots and concluded:

A 25' non-poly row took 10 minutes to weed

A 25' poly row only took 3 minutes to weed

If you extrapolated that into the time required to weed one acre, it would take approximately 200 hours to weed the non-poly and only 60 hours to weed the poly plot.

Variety Demonstrations

At each site we have set up variety demonstration plots that contain herbs and spices for identification purposes

Varieties at the Tisdale Site include:

Milk Thistle	Calendula
Feverfew	St. John's Wort
Senega	Sheep Sorrel
Valerian	Monarda
Lemon Balm	Hyssop
Anise Hyssop	Skull cap
Lamb's Ear	Yarrow
Garlic	Siberian Ginseng
American Ginseng	Stinging Nettle
Burdock	Elecampane
Oregano	Rosemary
Thyme	Basil
Silver Sage	Prairie Sage
Echinacea angustifolia	Echinacea purpurea
Goldenseal	

Varieties at the Conservation Learning Centre site include:

Yarrow	Senega
Arnica	Valerian
Echinacea angustifolia	Echinacea purpurea
Mugwort	Burdock
Sheep Sorrel	St. John's Wort
Lovage	Stinging Nettle
Peppermint	Spearmint
Primrose	Silver Sage
Prairie Sage	Rosemary

File Photos



Direct seeded *Echinacea angustifolia* with out the aide of poly. This photo was taken prior to weeding and demonstrates the heavy weed pressure plants experience when no weed control is used.



Direct seeded *Echinacea angustifolia* sown into poly. The seed was stratified and mixed with sand then surface applied into small holes in the poly. This photo was taken prior to weeding and demonstrates not only the reduced weed pressure but also the increase germination.



Helpers feed irrigation line under the plastic mulch. The PFRA's plastic mulch layer was used to lay stripes of mulch to demonstrate how the weed pressure would be reduced and the moisture conservation would be increased.



Eelcampne transplants sown with the aide of T-Tape irrigation. The darkened area around the plant shows the moisture distribution every 8"; therefore, only the plant receives water for maximum water conservation.